Fish Passage Culvert Inspections (FPCI) at selected crossings on the Bobtail, 200, 400, 800, and 900 FSR.

October 2005

FIA Project # 2424025

Prepared for:

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Executive Summary

Triton Environmental Consultants Ltd. was retained by Canadian Forest Products Ltd, Vanderhoof Division, to complete Fish-Passage Culvert Inspections (FPCI) along the Bobtail, 200, 400, 800, and 900 Forest Service Roads (FSR). FPCI attempt to identify culverts at road crossings that may present barriers to fish passage. The procedures used during this survey followed those outlined in the Fish Passage – Culvert Inspection Procedures manual (Parker 2000).

The Bobtail, 200, 400, 800, and 900 FSR are located within the eastern portion of the Nechako River (WSC 180-00000) watershed. The study area lies within the Vanderhoof South Resource Management Zone identified as part of the Vanderhoof Land and Resource Management Plan (LRMP). The Vanderhoof South Zone lies south of the agriculture and settlement area along the Highway 16 corridor, and is developed mainly through timber harvesting. Although numerous sport fish species (e.g. burbot, chinook salmon, kokanee) are known to occur in the major watercourses within the area (e.g. the Chilako River), 1:20,000 Fish and Fish Habitat inventories in the study area (e.g. Triton Environmental Consultants Ltd. 2005a, 2005b) indicate that rainbow trout are typically the only species of game fish that would be expected in smaller indirect tributaries to these systems.

A total of 32 sites were surveyed between September 29th and October 15, 2005 as part of the field program. Of these, full inspections (Form A) were completed on 30 sites. The remaining sites were found to be bridges, and were therefore not assessed. Of the 30 assessed sites, 12 of the culverts were determined to be partial barriers (10 medium priority, 2 low priority), and 18 were determined not to be barriers to fish migration. A culvert with maintenance issues, and one culvert that is a moderate sediment source have also been identified. The majority of culverts were found to have a diameter that was inadequate to accommodate the $Q_{100}$ culvert diameter estimate outlined in Parker (2000), however the formula presented in Parker is a conservative estimate.
1 Introduction

Triton Environmental Consultants Ltd. was retained by Canadian Forest Products Ltd., Vanderhoof Division to complete Fish-Passage Culvert Inspections along the Bobtail, 200, 400, 800, and 900 FSR. Field work for this project was completed between the 29th of September and the 15th of October, 2005. Office work was completed between the 17th of October and 21st of October, 2005.

1.1 Watershed information

The Bobtail, 200, 400, 800, and 900 Forest Service Roads (FSR) are located within the eastern portion of the Nechako River (WSC 180-00000) watershed. Streams within the study area are indirect tributaries to Cluculz Creek (WSC 180-191300), or the Chilako River (WSC 180-069000), with one site on an indirect tributary to the Sinkut River (WSC 180-225800). All three of the previously mentioned watercourses are in turn tributaries to the Nechako River (Figure 1).

The study area lies within the Vanderhoof South Resource Management Zone identified as part of the Vanderhoof Land and Resource Management Plan (LRMP). The Vanderhoof South Zone lies south of the agriculture and settlement area along the Highway 16 corridor, and is developed mainly through timber harvesting. First pass logging has occurred through most of the zone, with second pass already started in the Bobtail (Province of British Columbia 1997).

Moderate slopes, coarse, well-drained soils, moderate climate and relatively low elevations provide ideal conditions for intensive forestry management. In the past several years, mountain pine beetle has affected forest management significantly in the relatively even-aged pine stands found in leave areas between first pass blocks in the Bobtail area (Province of British Columbia 1997).
A fisheries objective stated for the zone includes the maintenance of fish access through water systems in the area, with the assessment of culverts and bridges as a strategy for achieving the objective.

1.1.1 Target fish species
Existing fisheries information is available for the Chilako River in the provincial on-line database (Province of British Columbia 2005a). Fish listed in the database as present in the Chilako River include chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*Oncorhynchus kisutch*). The presence of largescale sucker (*Catostomus macrocheilus*), northern pike minnow (*Ptychocheilus oregonensis*) and redside shiner (*Richardsonius balteatus*) have also been documented in the Chilako River (Triton 2003).

Historical information for Cluculz Creek (including Cluculz Lake) from the on-line provincial database (Province of BC 2005a) indicates that the following fish species are present: bull trout (*Salvelinus confluens*), burbot (*Lota lota*), Dolly Varden (*Salvelinus malma*), kokanee (*Oncorhynchus nerka*), lake chub (*Couesius plumbeus*), lake trout (*Salvelinus namaycush*), lake whitefish (*Coregonus clupeaformis*), largescale sucker, longnose sucker (*Catostomus catostomus*), mountain whitefish (*Prosopium williamsoni*), northern pikeminnow, peamouth chub (*Mylocheilus caurinus*), pygmy whitefish (*Prosopium coulteri*), rainbow trout (*Oncorhynchus mykiss*), redside shiner, and white sucker (*Catostomus commersoni*).

Historical information for the Sinkut River from the on-line provincial database (Province of BC 2005a) indicates that the following fish species are present: burbot, chinook salmon, largescale sucker, leopard dace (*Rhinichthys falcatus*), longnose dace (*Rhinichthys cattaractae*), rainbow trout, and redside shiner.

Although numerous sport fish species (*e.g.* burbot, chinook salmon, kokanee) are known to occur in the major systems previously listed, 1:20,000 Fish and Fish Habitat inventories in the study area (*e.g.* Triton Environmental Consultants Ltd. 2005a, 2005b) indicate that

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1 More recent work completed by Haas (1996) suggests that the historic reference to Dolly Varden likely refers to bull trout.
rainbow trout are typically the only species of game fish that would be expected in smaller indirect tributaries to these systems.

1.2 Purpose of Assessment

Funding for this project was obtained through the Forest Investment Account (FIA). The purpose of the FIA is to assist government to develop a globally recognized, sustainably managed forest industry (Province of British Columbia 2005b). Under the Land Base Investment Program of FIA, Fish-Passage Culvert Inspections are an activity geared towards helping achieve the goal of restoring aquatic environments. The replacement or repair of culverts found to be negatively impacting fish distribution is intended to increase the amount of habitat available to fish. The priorities identified through this project will contribute to the overall goal of sustainable forest management.

2 Methodology

The procedures used during this survey were consistent with the procedures outlined in the Fish Passage Culvert Inspection manual (Parker 2000). Water velocities were determined using a 2100 Model Swoffer meter (flow meter). For sites where the water depth in the culvert was too shallow for the meter, the floating object technique was the method used to measure water velocity.

The Triton crew utilized a Garmin 12XL GPS to collect UTM coordinates at the sites, which were downloaded in a digital format that allowed for easy mapping of site locations by Triton’s GIS staff. Photographs were taken with an Olympus Stylus 300 digital camera. Sampling was conducted using a Smith-Root 12B-POW backpack electrofisher. Gradients were taken with a 22 cm long Abney level.

All sites assessed in the field were then assigned a low, medium or high priority for restoration work using the scoring matrix outlined the FPCI manual (refer to the manual for a detailed explanation on prioritizing assessed culverts). The matrix takes into account the fish species present, the quality of the fish habitat, the degree to which the culvert is a
barrier, the length of accessible upstream habitat, the percentage of stream barred by the culvert, and whether or not there is additional problem culverts upstream.

### 2.1 Barrier Identification and Status

Barriers to fish passage that were identified in this project have been categorized according to the FPCI manual as full, partial, none or undetermined, and described as temporary or permanent. Examples of common temporary barriers include debris jams, beaver dams, and culverts.

The degree to which an obstacle is considered a barrier to fish passage is often difficult to ascertain, such as where fish are captured above and below an obstacle. There is also a wide range of conditions that contribute to provide or prevent fish passage. For example, features such as falls and cascades may only be passable under certain flows, which could be high or low depending on the attributes of the feature and flows.

The most reliable means of confirming full barriers to fish passage is to catch fish right up to a suspected barrier and continue sampling upstream without catching or observing fish. Permanent features such as bedrock waterfalls may only be partial barriers that prevent the passage of some species and/or size classes of fish. It is often possible to determine the degree to which an obstacle is a barrier to fish by comparing the representation of size classes of fish species captured above and below the obstacle.

In the absence of exhaustive and indicative field sampling, one must rely on existing information regarding the swimming and jumping capabilities of the fish species of concern, within this watershed. Based on 1:20,000 Fish and Fish Habitat inventories completed in the study area (e.g. Triton Environmental Consultants Ltd. 2005a, 2005b) and historical information (e.g. FISS database) the fish species of concern include rainbow trout (*Oncorhynchus mykiss*) and kokanee (*Oncorhynchus nerka*). The tables in the FPCI manual were used to establish swimming and jumping thresholds for size classes of the target species. The lower thresholds represent the maximum burst speed and jump height.
For example, for 50 mm rainbow trout these thresholds included a 0.4 m/s culvert water velocity, and 0.3 m culvert drop.

It is important to note that although Parker (2000) indicates that a threshold water velocity of 0.5 m/s represents the upper limit of passage for juveniles of many fish species, the likelihood of juveniles accessing habitats above the assessed culverts has been considered in order to assign a restoration priority independent of the FPCI matrix calculation.

Attributes of the life history and habitat preferences of rainbow trout have been considered in the refinement of restoration priorities. In particular, rainbow trout in the 50 mm size class are young-of-year fish, which often rear in the same reach in which they were spawned, or move downstream and utilize shallow riffles, pools and backwater habitats in smaller streams or channel margin habitats in larger tributaries. Young-of-year fish are typically weak swimmers and avoid habitats with high water velocity and turbulence. The upstream movement of young-of-year fish would be severely constrained in reaches where the average channel gradient is in excess of 5-8%, which usually results in cascade-pool morphology with cobble substrates and average water velocities in excess of 1 m/s.
3 Findings

3.1 Barrier Culverts

This section provides a summary of barrier culvert information based on the FPCI Summary Table (Form B), along with a brief description of each site and the circumstances supporting the classification. The sites are grouped by priority ranking (high, moderate and low). Relevant supporting information and discussion pertaining to the identified barrier culverts sites is also provided.

Table 1. Form B - FPCI summary table.

<table>
<thead>
<tr>
<th>Priority Rank</th>
<th>Score</th>
<th>Road</th>
<th>Site Number</th>
<th>Barrier</th>
<th>Stream Length Gained (m)</th>
<th>% Stream Barred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate 28</td>
<td>200 Road</td>
<td>5.70</td>
<td>Partial</td>
<td>5700</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Moderate 28</td>
<td>800 Road</td>
<td>20.9</td>
<td>Partial</td>
<td>2700</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Moderate 31</td>
<td>400 Road</td>
<td>26.3</td>
<td>Partial</td>
<td>800</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Moderate 34</td>
<td>400 Road</td>
<td>29.6</td>
<td>Partial</td>
<td>12400</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Moderate 28</td>
<td>400 Road</td>
<td>31.6</td>
<td>Partial</td>
<td>2230</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Moderate 35</td>
<td>400 Road</td>
<td>34.9</td>
<td>Partial</td>
<td>1740</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>Moderate 31</td>
<td>Bobtail</td>
<td>37.5</td>
<td>Partial</td>
<td>2900</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Moderate 38</td>
<td>Bobtail</td>
<td>50.4</td>
<td>Partial</td>
<td>6100</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>Moderate 35</td>
<td>Bobtail</td>
<td>54.8</td>
<td>Partial</td>
<td>4760</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Moderate 28</td>
<td>Bobtail</td>
<td>59.4</td>
<td>Partial</td>
<td>1570</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Low 24</td>
<td>400 Road</td>
<td>22.6</td>
<td>Partial</td>
<td>820</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Low 24</td>
<td>400 Road</td>
<td>36.0</td>
<td>Partial</td>
<td>800</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

3.1.1 High Priority

Based on the results of the FPCI scoring matrix, none of the assessed culverts are considered to be high priority for restoration work. This is primarily due to the fact that none of the culverts were assessed as being full barriers. Additionally culverts scored lower on the FPCI matrix as on all but four occasions the percent of stream barred by the partial barrier was 50% or less.
3.1.2 Moderate Priority

A total of 10 of the 12 culverts determined to be partial barriers were given a moderate priority for restoration work. For four of these culverts the primary rationale for the partial barrier assessment was high culvert water velocity. A culvert water velocity in excess of 0.4 m/sec can be a barrier to juvenile rainbow trout (50 mm) as they are incapable of burst speeds of 0.4 m/sec or are unable to sustain such burst speeds to allow passage through the total length of the culvert (Parker 2000). Excessive outfall drop was a contributing factor at two of the culverts (800 Road km 20.9, Bobtail km 37.5) and the remaining five were partial barriers due to a combination of both velocity and outfall drop. Following is a summary for each of the identified culverts including the rationale for the partial barrier classification. In addition, the Form A and photos from each site are provided.

Site 5.7 - 200 Road

This site was assessed as a partial barrier based on a combination of the average culvert water velocity, which was 0.81 m/sec (in one of the culverts) and the culvert outfall drops, which were 141 cm and 51 cm. The average water velocity taken at this site is double the 0.4 m/sec upper limit of passage for juvenile rainbow trout (50 mm) (Parker 2000). The measurable outfall drops on the two culverts present at this site were also considerably above the jumping height of juvenile rainbow trout, which is 0.3 m for 50 mm rainbow and 0.60 m for 125 mm rainbow. Rainbow trout were captured downstream of the culvert but none were captured above. However, immediately upstream of the culvert there is a large beaver pond which provides low value rearing habitat for rainbow trout, and the absence of fish in low value habitat is common. The inlet of the right culvert (facing downstream) is becoming blocked by beaver activity, which if not cleared could cause maintenance issues in the near future. The culvert diameters at this site are 610 mm and 800 mm (left to right facing downstream), which is less than the $Q_{100}$ culvert diameter estimate of 2000 mm.

Site 20.9 – 800 Road

This site was assessed as a partial barrier based on the culvert outfall drop, which was 31 cm. This is only slightly higher than the upper limit of 30 cm for juvenile (50 mm) rainbow trout (Parker 2000). There was no velocity barrier at this site (0.063 m/sec) and the culvert
slopes were 0.75%. No fish were captured above or below this culvert and the habitat surrounding the culvert is considered of low rearing value for rainbow trout. Approximately 50% of the stream is barred as a result of the culvert (partial barrier). The culvert diameter was 450 mm, while the $Q_{100}$ culvert diameter estimate was 1200 mm.

**Site 26.3 – 400 Road**

This site was assessed as a partial barrier based on the culvert water velocity of 0.515 m/sec. The outfall drop was 5 cm and the culvert slope was 1.75%, neither of which would make the culvert impassable to fish. No fish were captured upstream or downstream of the culvert. Approximately 79% of the stream is barred as a result of the culvert (partial barrier) with 800 m of stream potentially accessible upslope of the culvert, however the stream above the culvert is classified as a wetland reach with unconfined surface flow and standing water. As such the habitat located upstream of the culvert is of low value to rainbow trout.

**Site 29.6 – 400 Road**

This site had two culverts and was assessed as a partial barrier based on an average culvert water velocities of 0.73 m/sec and 0.81 m/sec (left to right), which exceeds the 0.4 m/sec upper limit of passage for the juveniles of most species. Neither culvert had a measurable outfall drop and the culvert gradients were 1% and 1.25 % (left to right). Rainbow trout were captured upstream and downstream of the culverts during the course of the survey. Approximately 25% of the stream is barred as a result of the partial barrier with 12,400 m of moderate value rearing habitat available upstream of the culvert. This habitat was assessed as being of moderate value based on the channel width (~ 5 m wide), moderate channel complexity (good cover, flows and riffle pool interchanges) and available gravels and holding pools for spawning. The culvert diameters were 1950 mm and 1900 mm while the $Q_{100}$ culvert diameter estimate was 3360 mm.

**Site 31.6 – 400 Road**

This site was assessed as a partial barrier based on the culvert water velocity of 0.86 m/sec, which is double that passable by 50 mm rainbow trout. There was no measurable outfall drop and the culvert slope was 1.75%. No fish were captured either side of the culvert.
The habitat upstream and downstream of the culvert is considered low to moderate rearing with moderate habitat complexity and cover downstream of the culvert but low value upstream due to fine substrates, trace cover and abundant beaver activity. The culvert diameter was 610 mm while the $Q_{100}$ culvert diameter estimate was 1600 mm.

**Site 34.9 – 400 Road**

This site was assessed as a partial barrier based on culvert water velocity (0.58 m/sec) and an outfall drop of 41 cm. No fish were captured either upstream or downstream of the culvert. Approximately 72% of the stream is barred as a result of the culvert (partial barrier). The stream above and below the culvert is considered to be of low-moderate rearing value for rainbow trout due to moderate cover, habitat complexity and sufficient water depths. The stream, however, has no spawning or overwintering habitat available. The culvert diameter was 650 mm while the $Q_{100}$ culvert diameter estimate was 1200 mm.

**Site 37.5 - Bobtail**

This site was assessed as a partial barrier based on an outfall drop of 41 cm, with an outfall pool depth of 35 cm. The average culvert slope was 0.63%, which would not limit the upstream movement of fish. Lake chub were captured downstream of the culvert but none were captured upstream. Approximately 56% of the stream is barred as a result of the culvert (partial barrier), with 2,900 m of stream potentially accessible upslope of the culvert. The habitat above the culvert was assessed as being low quality based on abundant beaver ponds and dam. The culvert diameter was 900 mm while the $Q_{100}$ culvert diameter estimate was 2000 mm.

**Site 50.4 - Bobtail**

This site was assessed as a partial barrier based on an average culvert water velocity of 0.58 m/sec, which exceeds the 0.4 m/sec upper limit of passage for juvenile (50 mm) rainbow trout. The outfall drop of 15 cm is not a barrier as the outfall pool depth is 28 cm. Similarly, the culvert gradient is only 1.5% and would not limit fish passage. Rainbow trout were captured upstream and downstream of the culvert during the course of the survey. Approximately 92% of the stream is barred as a result of the partial barrier with 6,100 m of moderate value rearing habitat available upstream of the culvert. This habitat
was assessed as being of moderate value based on the moderate channel gradient and good channel complexity. The culvert diameter was 950 mm while the \( Q_{100} \) culvert diameter estimate was 1600 mm.

**Site 54.8 - Bobtail**

This site was assessed as a partial barrier based on a high water velocity of 1.12 m/sec and the outfall drop of 58 cm. The average culvert water velocity is a barrier to juvenile rainbow trout 125 mm in length or smaller, while the outfall drop is only a barrier to juvenile rainbow trout below 50 mm in length. Rainbow trout were captured below the culvert but not above during the course of this survey. Approximately 41% of the stream is barred as a result of the culvert (partial barrier) with 4,760 m of stream potentially accessible upslope of the culvert. However, the stream above the culvert is highly impacted by beaver activity causing the habitat in this area to be of low value to rainbow trout. The culvert diameter was 1250 mm while the \( Q_{100} \) culvert diameter estimate was 1400 mm.

**Site 59.40 - Bobtail**

This site was assessed as a partial barrier based on the culvert water velocity of 0.98 m/sec at the outlet (which is double that passable by 50 mm rainbow trout), and the outfall drop of 43 cm. The culvert slope was 1.75%, which would not limit upstream fish movement. Rainbow trout were captured upstream and downstream of the culvert. The habitat upstream and downstream of the culvert is considered low rearing with limited habitat complexity and cover and abundant beaver activity above the culvert. The culvert diameter was 1000 mm, which is the same as the calculated \( Q_{100} \) culvert diameter.
Form A. Site 5.7 - Bobtail.
Comment: Inlet upstream.

Comment: Inlet downstream.
Site: 5.7 – 200 Road.  Roll: 100.  Frame: 100.  Date: October 13, 2005.
Comment: Outlet upstream.

Comment: Outlet downstream.
Form A. Site 20.9 – 800 Road.
Comment: Inlet upstream.

Comment: Inlet downstream.

Form A. Site 26.3 – 400 Road.
Comment: Inlet upstream.

Comment: Inlet downstream.
Comment: Outlet upstream.

Comment: Outlet downstream.
Form A. Site 29.6 – 400 Road.
Comment: Inlet upstream.

Comment: Inlet downstream.
Site: 29.6 – 400 Road. Roll: 100. Frame: 82. Date: October 13, 2005.
Comment: Outlet upstream.

Comment: Outlet downstream.
Form A. Site 31.6 – 400 Road.

Comment: Outlet upstream.

Comment: Outlet downstream.
Form A. Site 34.9 – 400 Road.

Site: 34.9 – 400 Road. Roll: 100. Frame: 75. Date: October 11, 2005.
Comment: Outlet upstream.

Site: 34.9 – 400 Road. Roll: 100. Frame: 76. Date: October 11, 2005.
Comment: Outlet downstream.
Form A. Site 37.5 – Bobtail.

Comment: Outlet upstream.

Comment: Outlet downstream.
Form A. Site 50.4 – Bobtail.
Comment: Inlet upstream.

Comment: Inlet downstream.

Form A. Site 54.8 – Bobtail.
Comment: Inlet upstream.

Comment: Inlet downstream.
Comment: Outlet upstream.

Comment: Outlet downstream.
Form A. Site 59.4 – Bobtail.
Comment: Outlet upstream.

Comment: Outlet downstream.
3.1.3 Low Priority

A total of 2 of the 12 culverts identified as partial barriers were assigned a low priority for restoration based on the FPCI scoring matrix. The primary rationale for the partial barrier status for one of the culverts was an average culvert velocity in excess of 0.4 m/sec. Outfall drop and water velocity were contributing factors at the other low priority culvert.

Site 22.6

This site has two culverts (one which was dry at the time of survey) and was assessed as a partial barrier based on the culvert water velocity of 0.4 m/sec at the outlet of the right culvert. The right culvert had no measurable outfall drop, where as the left culvert was hanging above the water 10 cm at the inlet and 9 cm at the outlet. The culvert slopes were 0.5 % and 0.25% (left to right). No fish were captured upstream or downstream of the culverts during 422 seconds of electrofishing effort. The culverts diameters were 450 mm and 900 mm while the Q_{100} culvert diameter estimate was 1800 mm.

Site 36.0

This culvert was assessed as having a partial barrier to juvenile rainbow trout (50 mm) based on a culvert water velocity of 0.54 m/sec and an outfall drop of 31 cm. No fish were captured downstream or upstream of the culvert during 225 seconds of electrofishing effort. Approximately 22% of the stream is barred as a result of this partial barrier. The habitat above the culvert was assessed as being low quality based on a narrow channel (< 1.0 m wide), and the low channel complexity (very limited pool formation and lack of riffle-pool interchanges). The culvert diameter was 610 mm while the Q_{100} culvert diameter estimate was 900 mm.
Form A. Site 22.6 – 400 Road.
Site: 22.6 – 400 Road.  
Roll: 100.  
Frame: 93.  
Date: October 13, 2005.  
Comment: Inlet upstream.

Site: 22.6 – 400 Road.  
Roll: 100.  
Frame: 94.  
Date: October 13, 2005.  
Comment: Inlet downstream.
Comment: Outlet upstream.

Comment: Outlet downstream.
Form A. Site 36.0 – 400 Road.

Site: 36.0 – 400 Road. Roll: 100. Frame: 71. Date: October 11, 2005.
Comment: Outlet upstream.

Site: 36.0 – 400 Road. Roll: 100. Frame: 72. Date: October 11, 2005.
Comment: Outlet downstream
3.2 Culverts of Significance

This section includes all non-barrier culvert sites of significance and the Other Priority Culvert Crossings Summary Table (Form C). This table is a summary of sites that were fully assessed and were found to have no fish passage issues. However, these sites were found to contain either maintenance or moderate sedimentation issues which may need to be addressed. Only two such culverts (Site 44.3 - Bobtail, Site 33.5 - Bobtail) were identified over the course of the project and they are summarized in Table 2.

Table 2. Other priority culvert crossing summary (Form C).

<table>
<thead>
<tr>
<th>Priority Ranking</th>
<th>Site</th>
<th>Maintenance Issues</th>
<th>Sediment Source</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>44.3 – Bobtail</td>
<td>Y</td>
<td>N</td>
<td>Inlet is partially crushed and beaver cage on outlet has fallen off culvert.</td>
</tr>
<tr>
<td>Low</td>
<td>33.5 - Bobtail</td>
<td>N</td>
<td>Y</td>
<td>Road fill is entering creek both on upstream and downstream ends of the culvert.</td>
</tr>
</tbody>
</table>
3.3 **Remaining Sites**

This section provides a brief description of the remaining sites, which fall into one of two categories: sites lacking barrier status and sites not assessed.

#### 3.3.1 **Non-Barrier Sites**

A total of 18 of the 32 sites assessed were determined to contain no barriers to fish migration. All 18 of these sites were found to contain outfall drops of less than 0.3 m, had an average water velocity of less than 0.4 m/second, and a gradient of less than 5%. In addition, rainbow trout were captured upstream of the culvert at one of the sites (27.2 – 400 Road) and downstream of the culvert at sites 33.5 (Bobtail) and 57.20 (Bobtail). No fish were captured upstream of the culverts at sites 44.3 (Bobtail) and 57.20 (Bobtail), however, the habitat upstream is of low rearing value. Of the 18 sites 5 (2.2 – 900 Road, 22.4 – 800 Road, 18.3 – 800 Road, 0.9 – 800 Road, and 37.7 – 400 Road) were classified as non-classified drainage (NCD) above and below the culvert. These characteristics include the lack of a defined channel, continuous scour or alluvial deposits. In addition these sites often contained rooted vegetation across the basin, and only had evidence of minor unconfined surface flow (*i.e.* seepage) or isolated pools of standing water (no channel formation).
Form A. Site 33.5 – Bobtail.

Comment: Outlet upstream.

Site: 33.5 - Bobtail. Roll: 100. Frame: 3. Date: September 29, 2005.
Comment: Outlet downstream.
Form A. Site 34 – Bobtail.
Site: 34.0 - Bobtail. Roll: 100. Frame: 5. Date: September 29, 2005.
Comment: Inlet upstream.

Comment: Inlet downstream.
Comment: Outlet upstream.

Comment: Outlet downstream.